UNUSUAL PHOSPHATE IN HERCYNITE-KAMACITE OBJECTS IN THE YAMATO-82133 ORDINARY CHONDRITE (H3). N.G.Zinovieva, O.B.Mitreikina, and L.B.Granovsky, Department of Petrology, Faculty of Geology, Moscow State University, Lenin Gory, Moscow 119899, Russia (zinov@geol.msu.ru).

The Y-82133 ordinary chondrite is peculiar in the occurrence of clearly separated chondrule-like objects (HKO) that typically consist of kamacite, hercynite, corundum, chrome spinelid, and phosphates. The phosphates include a new mineral, which can be described by the formula $Na_3K(Mg,Fe,Mn)_7(PO_4)_6$ and seems to be a variety of fillowite. The richness of the HKO-forming melt in alkalis and phosphorus predetermine its lower viscosity and solidus temperature than those of the silicate chondrule melt.

The Yamato-82133 ordinary chondrite (H3) is specific in widespread peculiar aggregates: they contain regular intergrowths of hercynite and kamacite, sometimes in assemblage with corundum [5, 6]. Al-bearing phases (hercynite and corundum) are apparently restricted to certain textural sites. The hercynite-kamacite objects (HKO) are the most widespread in the chondrite matrix but also occur as droplets in the silicate chondrules. Hercynite-kamacite aggregates occur in the chondrite matrix interstitially between silicate chondrules. Sometimes, HKO form veinlets, which intrude chondrules and cut them, or develop as rounded chondrule-like aggregates, which are clearly separated from the more oxidized metallic matrix. The general textural position of HKO and analysis of the textural phase relationships in HKO and variations of their mineral composition provide convincing evidence for the magmatic genesis of these objects [7]. The composition of the HKO-forming melt can be inferred from the mineralogy of the aggregates: the occurrence of chrome spinels is suggestive of the elevated Cr content of the melt, ubiquitous phosphates point to its richness in P, and the occurrence of Na-K phosphate, which is atypical of the matrix assemblages, suggests the presence of alkalis.

Phosphates are specific and ubiquitous minerals of HKO. The three phosphates detected in HKO are whitlockite, Cl-apatite, and Na-K phosphate; the minerals differ in their chemistry and textures. The whitlockite and Cl-apatite occur as rounded grains (up to 15 µm) in both the matrix and intrachondrule HKO. In the latter, these minerals are restricted to the contact with the chondrule material. Sometimes, they are zoned, with the cores consisting of whitlockite and the rims composed of Cl-apatite. The Na-K phosphate was detected only in the matrix HKO, in which it forms rounded grains up to 10 µm in diameter. The occurrence of tiny grains of Na-K phosphate in kamacite in ordinary chondrites H3 Dhajala and H4 Forest Vale was earlier described by Perron et. al [4], who demonstrated that the phosphate does not correspond to any known mineral. In our case Na-K phosphate is much higher in Na. The averaged chemical composition of this mineral (Na_2O - 11.2; K_2O - 5.2; CaO - 0.1; MgO - 30.0; FeO - 4.7; MnO - 0.6; P_2O_5 - 48.1; SiO_2 - 0.1) and its idealized formula $Na_3K(Mg,Fe,Mn)_7(PO_4)_6$ suggests its relation to such rare phosphates as fillowite $Na_2Ca(Mn,Fe)_7(PO4)_6$ [1], johnsomervilleite $Na_2CaMg_3(Fe,Mn)_4(PO_4)_6$ [2], and chladniite $Na_2CaMg_7(PO_4)_6$ [3] - all of them having cell parameters and symmetry groups affiliating to the space group of fillowite. Chladniite was detected [3], as a predominant phase, in the Carlton iron meteorite (IIICD) at the contact between silicate-bearing inclusions and nickel iron with schreibersite and accompanying olivine, pyroxene, plagioclase, and Cl-apatite. The diversity of minerals in the fillowite structural group (fillowite, johnsomervilleite, and chladniite) is determined by the isomorphism of elements in different structural sites: chladniite is a magnesian analog of fillowite, and johnsomervilleite is their ferrous-magnesian analog. McCoy *et al*. [3] describe fillowite, johnsomervilleite, and chladniite by the same formula $Na_2CaX_7(PO_4)_6$, where X is Mg^{2+}, Fe^{2+}, and Mn^{2+}. The replacement of bivalent Ca^{2+} by the sum of monovalent Na^+ and K^+ results in a phosphate phase with a formula analogous to that of the Na-K phosphate in HKO. Conceivably, the mineral is a Na-K Ca-free analog of fillowite. Unfortunately, the small size of its grains does not allow for its X-ray diffraction analysis.

The occurrence of the alkali phosphate in the HKO argues for the richness of these objects in alkalis and phosphorus, which decreased the crystallization temperature of the HKO- forming melt. It seems to be this property that predetermined the textural relationships between the HKO and silicate chondrules: HKO-forming melts intruded the already crystalline olivine-pyroxene chondrules along fractures, with the crystallization of the melts being essentially controlled by the morphology of these fractures.

Acknowledgments - We are grateful to National Institute of Polar Research (Tokyo, Japan) for providing a thin section of the Yamato-82133 chondrite. We thank Dr. O. V. Yakubovich for discussion concerning phosphate mineralogy. This work was supported by the Russian Foundation for Basic Research, grant 96-05-65387.

References: [1] Araki T. and Moore P. B. (1981) *Am. Mineral*., **66**, 827-842; [2] Livingstone A. (1980) *Scotland Mineral. Mag.*, **43**, N331, 833-836; [3] McCoyT. J. *et al*. (1994) *Am. Mineral.*, **79**, 375-380; [4] Perron et al. (1990) *Meteoritics*, **25**, N 3, 398-399; [5] Zinovieva N.G et al. (1996a) *LPSC* **27**, 1499-1500; [6] Zinovieva N.G. et al. (1996b). *21st Symp. on Ant. Met*., 222-224; [7] Zinovieva N.G. et al. (1997). *Proc. NIPR Ant. Met*., **10**, (in press).